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Ehben et al.

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(54) **INTEGRATED CIRCUIT HAVING
CAPACITIVE ELEMENTS**

5,606,197 A 2/1997 Johansson et al.
6,146,939 A * 11/2000 Dasgupta 438/253

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(58) **Field of Search** 257/295-310, 257/530-536, 758; 361/310-314; 438/253-254, 396-398

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,396,198 A 3/1995 Yamashita et al.

FOREIGN PATENT DOCUMENTS

DE	43 22 354 A1	1/1994
EP	0 163 384 A1	12/1985
EP	0 656 657 A1	6/1995
EP	0 908 950 A2	4/1999
JP	02-250370 A	10/1990
JP	04/127464 A	4/1992
JP	09-246476	9/1997

* cited by examiner

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(57) **ABSTRACT**

An integrated circuit having capacitive elements for smoothing a supply voltage is described. In this case, at least one additional metal electrode, which is configured as a high frequency-optimized capacitance and is distinguished by an extremely low sheet resistance, is connected in parallel with the MOS capacitances. By connecting the areally highly effective MOS capacitance, which, however, is connected with a somewhat higher impedance, in parallel with areally less effective metal capacitances, which, however, are connected to the supply voltage in a very low-impedance manner, it is possible to obtain broadband buffering and thus decoupling of high-frequency interference signals. Very high-frequency interference components are attenuated on the chip and do not pass into the system surrounding the integrated circuit.

12 Claims, 3 Drawing Sheets

